Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (currently amended) A process for generating polysulfide in a pulping liquor, comprising the steps of:

a. providing a pulping liquor containing sodium sulfide;

b. preparing at least one oxidation promoter element by:

i. coating at least a portion of a metallic substrate with a coating of organic polymer material such that one side of the coating material is adjacent the substrate and an opposite side of the coating is not exposed to the substrate, ~~and~~

ii. applying an oxidation promoter to the opposite side of the coating such that the oxidation promoter is adhered by the coating material to the substrate, said oxidation promoter comprising a transition metal oxide; and

iii. baking the oxidation promoter and coating of organic polymer material; and

c. contacting the at least one oxidation promoter element with the pulping liquor so as to generate polysulfide in the pulping liquor.

2. (Original) The process of claim 1, wherein the pulping liquor comprises white liquor, green liquor, black liquor, or orange liquor.

3. (Original) The process of claim 1, wherein at least some of the sodium sulfide is oxidized to generate polysulfide in the pulping liquor by the oxidizing promoter.

4. (Original) The process of claim 3, wherein a majority of the sodium sulfide is oxidized by the oxidizing promoter.

5. (Canceled)

6. (Canceled)

7. (Canceled)

8. (Canceled)

9. (Canceled)

10. (Canceled)

11. (Original) The process of claim 1, wherein the at least one oxidation promoter element is a plurality of oxidation promoter elements contacting the pulping liquor.

12. (Original) The process of claim 11, wherein any one of the plurality of oxidation promoter elements includes a major dimension that is less than about 40 cm.

13. (Original) The process of claim 1, wherein the pulping liquor is contained within at least one vessel and the at least one oxidation promoter element is positioned within the at least one vessel.

14. (Original) The process of claim 13, further comprising the step of fixing the at least one oxidizing promoter element to the vessel.

15. (Original) The process of claim 13, further comprising the step of positioning the at least one oxidizing promoter element at a bottom of the at least one vessel.

16. (Original) The process of claim 13, further comprising the step of positioning the at least one oxidizing promoter element in the at least one vessel such that the at least one oxidizing promoter element is mobile in the at least one vessel.

17. (Canceled)

18. (Previously Presented) The process of claim 13, further comprising the step of rotating the substrate within the vessel.

19. (Original) The process of claim 1, wherein an oxidative state of the oxidation promoter is increased by contacting at least one oxidizing agent with the oxidation promoter.

20. (Original) The process of claim 19, wherein the at least one oxidizing agent includes at least one of sodium hydroxide and an oxygen-containing gas.

21. (Original) The process of claim 19, wherein the at least one oxidizing agent includes oxygen-enriched air.

22. (Original) The process of claim 19, wherein the at least one oxidizing agent and the pulping liquor simultaneously contact the at least one oxidation promoter element.

23. (Original) The process of claim 22, wherein at least some of the sodium sulfide is oxidized to create polysulfide by the at least one oxidizing agent.

24. (Original) The process of claim 19, wherein the at least one oxidizing agent is contacted with the at least one oxidation promoter element when the at least one oxidation promoter element is in minimal or no contact with the pulping liquor, and the pulping liquor is contacted with the at least one oxidation promoter element when the at least one oxidation promoter element is in minimal or no contact with the at least one oxidizing agent.

25. (Original) The process of claim 19, wherein the at least one vessel comprises a first vessel including a first oxidation promoter element and a second vessel including a second oxidation promoter element, and the method further comprises:

d. providing pulping liquor to the first vessel to facilitate polysulfide production within the first vessel when the second vessel is provided with the at least one oxidizing agent to increase the oxidized state of the second oxidation promoter element; and

e. providing pulping liquor to the second vessel to facilitate polysulfide production within the second vessel when the first vessel is provided with the at least one oxidizing agent to increase the oxidized state of the first oxidation promoter element.

26. (Original) The process of claim 1, wherein a temperature at which the polysulfide is generated ranges from about 50°C to about 120°C.

27. (Original) The process of claim 1, wherein a temperature at which the polysulfide is generated ranges from about 75°C to about 85°C.

28. (currently amended) A system for generating polysulfide from pulping liquor containing sodium sulfide, comprising:

at least one vessel for containing the pulping liquor, comprising an inlet to facilitate the flow of pulping liquor into the at least one vessel, and an outlet to facilitate the flow of pulping liquor from the at least one vessel; and

at least one oxidation promoter element prepared by:

coating at least a portion of a metallic substrate with a coating of organic polymer material such that one side of the coating material is adjacent the substrate and an opposite side of the coating is not exposed to the substrate, ~~and~~

applying an oxidation promoter to the opposite side of the coating such that the oxidation promoter is at least partially embedded in the coating material, the oxidation promoter promoting the oxidation of the sodium sulfide to generate polysulfide, said oxidation promoter comprising a transition metal oxide; and

baking the oxidation promoter and coating of organic polymer material,

wherein the at least one oxidation promoter element is positioned within the at least one vessel to contact the pulping liquor.

29. (Original) The system of claim 28, further comprising at least one oxidizing agent and a conduit for receiving the at least one oxidizing agent, one end of the conduit fluidly communicating with the vessel.

30. (Original) The system of claim 28, further comprising a mixing element positioned within the at least one vessel for mixing the pulping liquor.

31. (Original) The system of claim 30, further comprising a hollow shaft disposed at least partially within the at least one vessel, the mixing element being disposed at an end of the hollow shaft.

32. (Original) The system of claim 31, further comprising at least one oxidizing agent and a conduit for receiving at least one oxidizing agent, one end of the conduit fluidly communicating with the vessel, and the hollow shaft having a first aperture adjacent an upper end of the shaft and a second aperture adjacent a lower end of the shaft so as to allow the at least one oxidizing agent to flow through the first aperture and exit through the second aperture.

33. (Original) The system of claim 28, wherein the at least one vessel comprises first and second vessels, the at least one oxidation promoter element comprises a first oxidation promoter element positioned within the first vessel and a second oxidation promoter element positioned within the second vessel, and the system is configured to provide pulping liquor to the first vessel when the second vessel contains the at least one oxidizing agent and provide pulping liquor to the second vessel when the first vessel contains or receives the pulping liquor.

34. (Original) The system of claim 28, wherein the at least one oxidation promoter element comprises a plurality of oxidation promoter elements having a major dimension of less than about 40 cm.

35. (Canceled)

36. (Previously Presented) The system of claim 28, wherein the at least one oxidation promoter is further attached to a shaft, and the shaft is in communication with a drive element that rotates the shaft and the at least one oxidation promoter in the at least one vessel.

37. (Previously Presented) A system for generating polysulfide from pulping liquor containing sodium sulfide, comprising:

a polysulfide generation zone that receives pulping liquor including sodium sulfide to facilitate the generation of polysulfide;

a recovery zone that receives at least one oxidizing agent; and

at least one oxidation promoter element that is movable between the polysulfide generation zone and the recovery zone, wherein:

the at least one oxidation promoter element comprises a substrate with a coating material disposed thereon, wherein the coating material includes an oxidation promoter that promotes oxidation of the sodium sulfide in the pulping liquor to generate polysulfide; and

the substrate is rotatably secured to a support member to facilitate movement of the substrate between the polysulfide generation zone and the recovery zone.

38. (Original) The system of claim 37, wherein the at least one oxidizing agent includes at least one of sodium hydroxide and an oxygen-containing gas to increase the oxidative state of the at least one oxidation promoter upon contacting the at least one oxidizing agent with the at least one oxidation promoter.

39. (Canceled)

40. (Canceled)

41. (Previously Presented) The system of claim 37, wherein the polysulfide generation zone includes at least one vessel containing an inlet to facilitate the flow of pulping liquor into the polysulfide generation zone and an outlet to facilitate the flow of pulping liquor out of the polysulfide generation zone, and the recovery zone includes at least one vessel that receives the at least one oxidizing agent.

42. (Previously Presented) The system of claim 37, wherein the polysulfide generation zone comprises two vessels that each receive a pulping liquor containing sodium sulfide, the recovery zone comprises a vessel that is disposed between the two vessels of the polysulfide generation zone and is configured to receive the at least one oxidizing agent.

43. (Original) The system of claim 42, wherein the at least one oxidation promoter element includes a first oxidation promoter element that is independently movable between one of the vessels of the polysulfide generation zone and the vessel of the recovery zone and a second oxidation promoter element that is independently movable between the other of the vessels of the polysulfide generation zone and the vessel of the recovery zone.

44. (Previously Presented) The system of claim 37, wherein the polysulfide generation zone is adjacent the recovery zone and the substrate of the at least one oxidation promoter element comprises at least one disc that is disposed between and extends into both the polysulfide generation and recovery zones, the at least one disc being rotatable with respect to the polysulfide generation and recovery zones to selectively situate the at least one oxidation promoter element within each of polysulfide generation zone and the recovery zone.

45. (Original) The system of claim 44, wherein the at least one disc comprises a plurality of spatially separated rotatable discs.

46. (Original) The system of claim 37, further comprising:

at least one baffle disposed within at least one of the polysulfide generation zone and the recovery zone to facilitate mixing of fluid flowing around the at least one baffle.

47. (Original) A method of generating polysulfide from a pulping liquor containing sodium sulfide, the method comprising:

a. providing pulping liquor to a polysulfide generation zone;

b. providing at least one oxidizing agent to a recovery zone; and

c. selectively moving at least one oxidation promoter element between the polysulfide generation zone and the recovery zone;

wherein polysulfide is generated from sodium sulfide within the pulping liquor when the at least one oxidation promoter element is situated within the polysulfide generation zone, and the oxidative state of the at least one oxidation promoter is increased when the at least one oxidation promoter is situated within the recovery zone and in contact with the at least one oxidizing agent.

48. (original) The method of claim 47, wherein the at least one oxidizing agent includes at least one of sodium hydroxide and an oxygen-containing gas.

49. (Original) The method of claim 47, wherein the at least one oxidation promoter element comprises a substrate with a coating material disposed thereon, wherein the coating material includes an oxidation promoter that promotes oxidation of the sodium sulfide in the pulping liquor to generate polysulfide.

50. (Original) The method of claim 49, wherein the substrate is rotatably secured to a support member to facilitate movement of the substrate between the polysulfide generation zone and the recovery zone.

51. (Original) The method of claim 47, wherein the polysulfide generation zone includes at least one vessel containing an inlet to receive pulping liquor into the polysulfide generation zone and an outlet to remove pulping liquor from the polysulfide generation zone, and the recovery zone includes at least one vessel to receive the at least one oxidizing agent.

52. (Original) The method of claim 47, wherein the polysulfide generation zone comprises two vessels that each receive pulping liquor, the recovery zone comprises a vessel that is disposed between the two vessels of the polysulfide generation zone and is configured to receive the at least one oxidizing agent.

53. (Original) The method of claim 52, wherein the at least one oxidation promoter element includes a first oxidation promoter element that is selectively moved between one of the vessels of the polysulfide generation zone and the vessel of the recovery zone and a second oxidation promoter element that is selectively moved between the other of the vessels of the polysulfide generation zone and the vessel of the recovery zone.

54. (Original) The method of claim 47, wherein the polysulfide generation zone is adjacent the recovery zone and the substrate of the at least one oxidation promoter element comprises at least one disc that is disposed between and extends into both the polysulfide generation and recovery zones, and the at least one disc is rotated with respect to the polysulfide generation zone and the recovery zone to selectively situate the at least one oxidation promoter element within each of the polysulfide generation and recovery zones.

55. (Original) The method of claim 54, wherein the at least one disc comprises a plurality of spatially separated discs that are rotated with respect to the polysulfide generation zone and the recovery zone.

56. (Original) The method of claim 47, further comprising:

d. providing at least one baffle within at least one of the polysulfide generation zone and the recovery zone to facilitate mixing of fluid flowing around the at least one baffle.